SENG 697
Agent-based Software Engineering
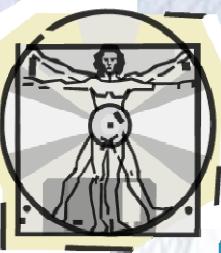
Session 2 : Methodologies for agent-based analysis and design

Behrouz Far
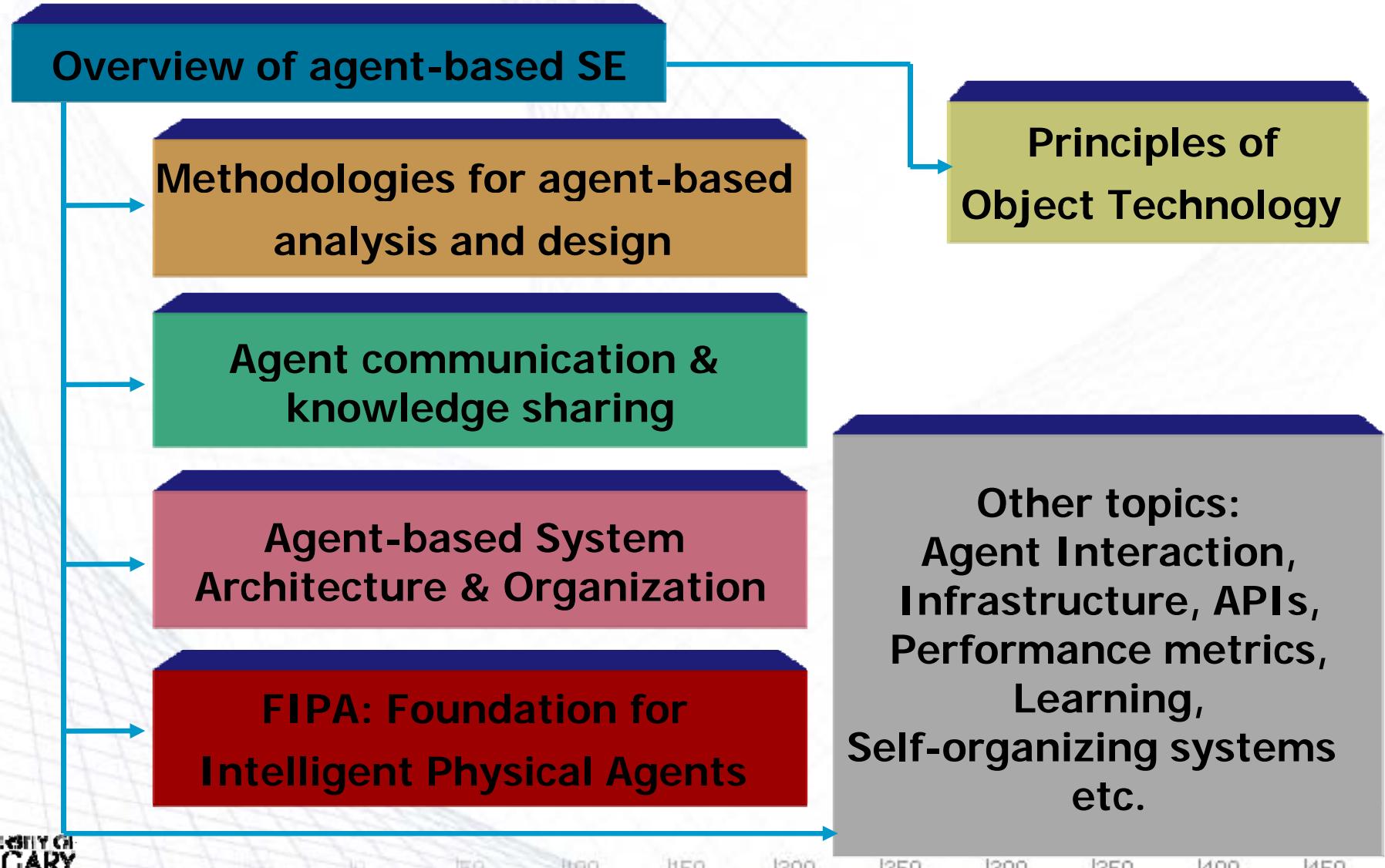
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Course Curriculum

Overview of agent-based SE

Methodologies for agent-based analysis and design

Agent communication & knowledge sharing

Agent-based System Architecture & Organization

FIPA: Foundation for Intelligent Physical Agents

Principles of Object Technology

Other topics: Agent Interaction, Infrastructure, APIs, Performance metrics, Learning, Self-organizing systems etc.

# Multi Agent system Development
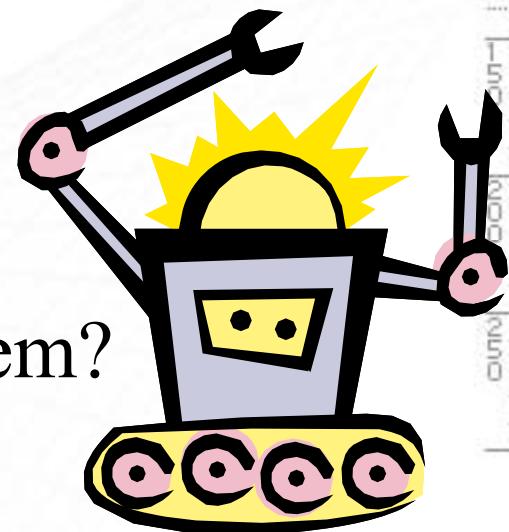
What do we need to develop an agent-based system?
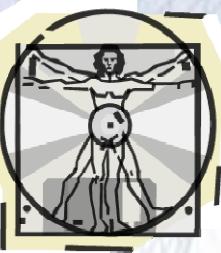
Agent-based development *methodology*

- How to analysis and design a multi-agent system?
  - e.g., GAIA, Tropos, Prometheus, etc.

Agent-based development *platform*

- How to implement a multi-agent system?
 - e.g., FIPA-OS, Jade, Jive, Aglets, etc.

Introduction (contd.)
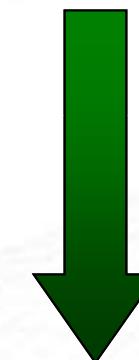
- Evolution of software engineering paradigms:
    - Assembly languages
    - Procedural and structured programming
    - Object Oriented programming
    - Component-ware
    - Design patterns
    - Software architectures
    - ...
    - **Software Agents**

time
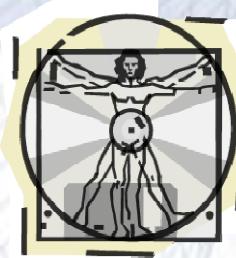
Languages that have their conceptual basis determined by machine architecture

Increase of Complexity
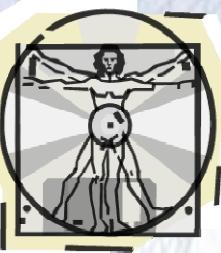
Languages that have their key abstractions rooted in the problem domain
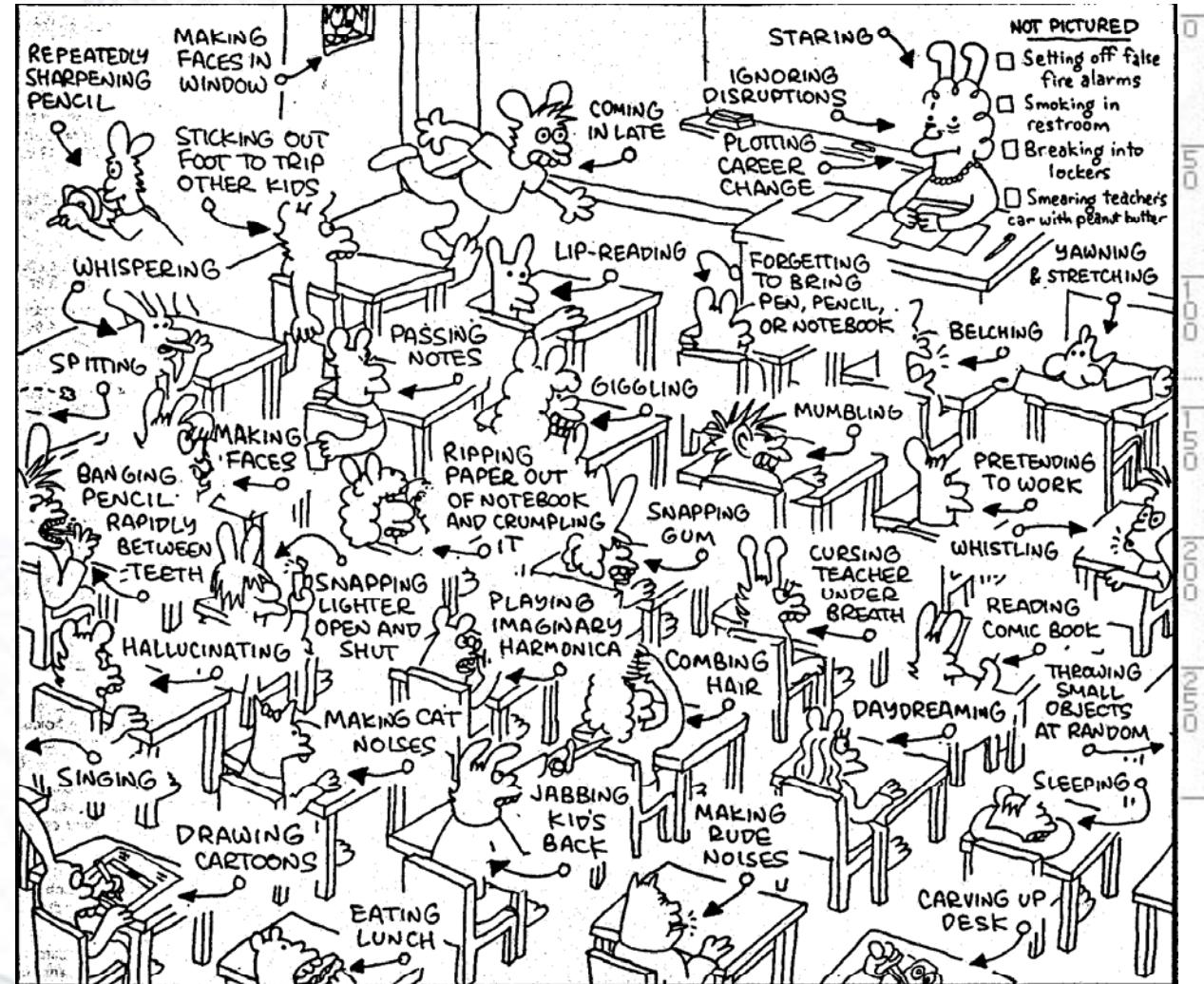
Why We Need This?
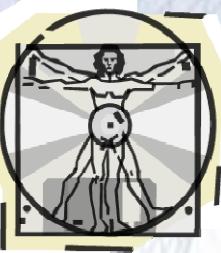
- The authors have devised a methodology that has been specifically tailored to the analysis and design of agent-based systems.

- Why we need this?

Why We Need This? (contd.)
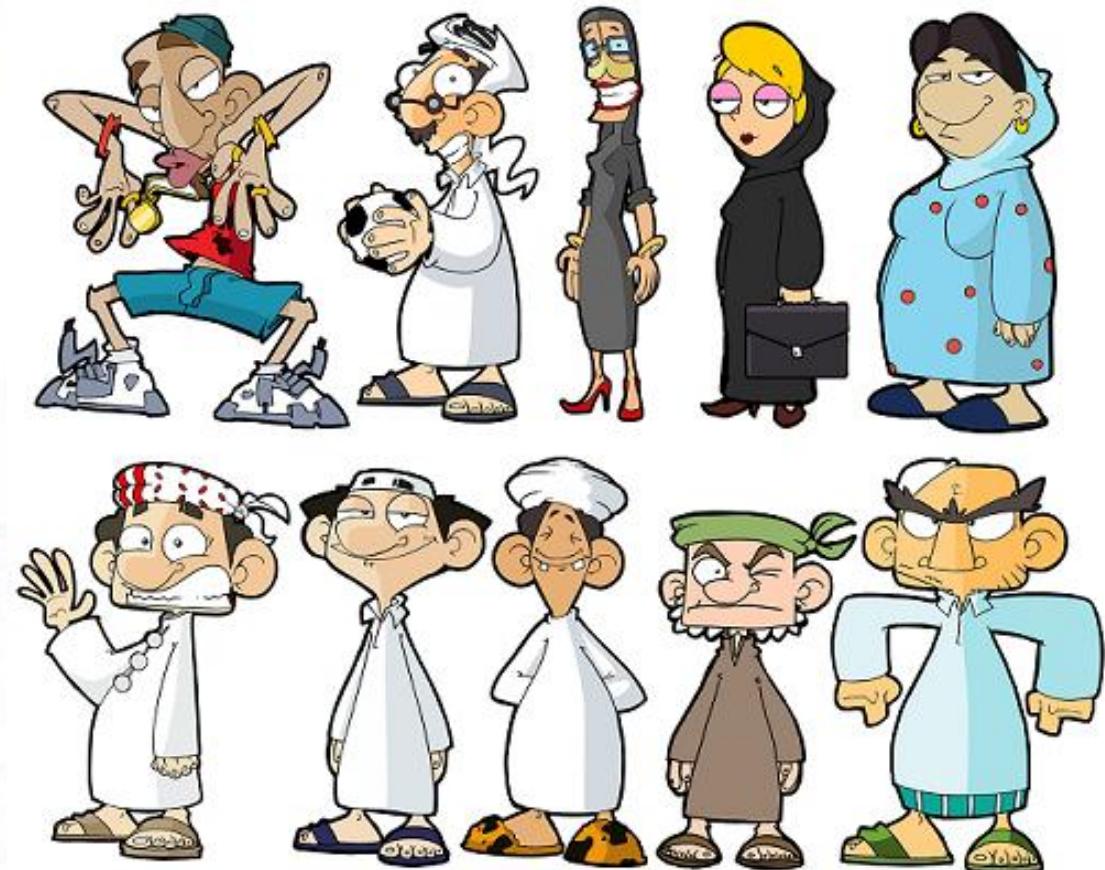
- The way Object Oriented systems are designed
- Objects and their "pre-defined" interactions are designed
- Behaviour is the result of objects interactions
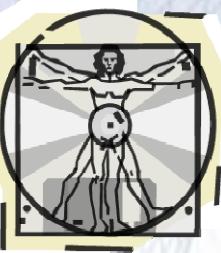
Why We Need This? (contd.)

- The way agent-based systems are designed

- Agents, their "roles" in the society, "goals" and "possible" ways of interactions are defined.

- Behaviour is the result of agents interactions
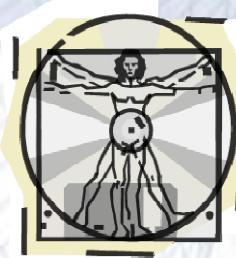
Why We Need This? (contd.)

- Existing software development methodologies are rather unsuitable for agent based software engineering tasks

- There is a fundamental mismatch between the concepts used by object-oriented developers and the agent-oriented view. They fail to adequately capture

  - Agents' flexible, autonomous (problem-solving) behaviour

  - Richness of agent interactions

  - Complexity of an agent system organizational structures

Contents

- **Session 2 : Methodologies for agent-based analysis and design**
  - A Methodology for Agent-Oriented Analysis and Design (GAIA)
  - Tropos
  - The MASSIVE Development Method
  - Comparison of development techniques